CROP PRODUCTION NEWS

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CROPS

Editor's Comments

By Faye Dokken-Bouchard, PAg, Crops Branch

Many of the crops in Saskatchewan are behind their normal stages of development for this time of year (www.agriculture.gov.sk.ca/crop-report). The weather continues to determine progress as well as general health of crops across the province. Recent sunshine along with hot, dry conditions were a welcome factor in accelerating crop development and suppressing plant diseases favoured by moisture. However, some of these extremely hot days have been followed by storms, resulting in high humidity, rain and hail. Damage caused by hail and strong winds can further delay crop maturity and facilitate plant disease by stressing the crop, creating wounds for pathogen entry, and physically spreading pathogen spores throughout the crop. However, if damage has not been too severe and occurred before pods/seeds have developed, recovery can be expected under good growing conditions.

Continue to watch for environmental damage, weeds, insects and disease. Assess the success of your pest control measures with follow-up crop scouting. This edition of CPN will help you decide when to stop spraying fungicides, determine which insects to watch for, and provide tips on how to assess other damage symptoms. For more information on these issues and more, visit www.agriculture.gov.sk.ca/Crop-Protection.

NOTE: Throughout this document, you will see that some publications are in blue font and underlined, indicating links to website information. If you are reading this on your computer screen, click your cursor on the link to take you directly to the website. ✪

Crop Production News is a bi-weekly publication prepared primarily by provincial specialists with the Crops Branch and Regional Services Branch of the Saskatchewan Ministry of Agriculture. It is a compilation of articles related to entomology, plant pathology, weed science, soils and agronomy issues.

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Saskatchewan Ministry of Agriculture

Crop Protection Laboratory Update

By Philip Northover, AAg, Supervisor, Crop Protection Laboratory

The trend in samples continues to be related to chemical injuries for the crops, and in the past week we have doubled the total number of submissions in the plant disease/disorder category. No insects or weeds have been submitted in the past two weeks.

Diseases diagnosed in the past two weeks:
Barley: Environmental Damage
Canola: Chemical Injury
Durum: Physiological Leaf Spot (Chloride deficiency), Common Root Rot
Lentils: *Fusarium* Root Rot, Chemical Injury (multiple samples)
Peas: *Fusarium* Root Rot, Septoria Leaf Spot

More Dutch elm disease (DED) samples arrived at the laboratory recently, with a few positive diagnoses and more results pending. It is illegal to transport elm wood, or to store elm fire wood. The elm bark beetle, which can transport the fungus, is attracted to the smell of the freshly cut wood. They are most active from April 1 to August 31. As a result, it is illegal to prune elm trees in this time frame. An elm tree can be removed at any time, as long as proper removal practices are adhered to. Following these procedures is necessary to prevent the further spread of the disease.

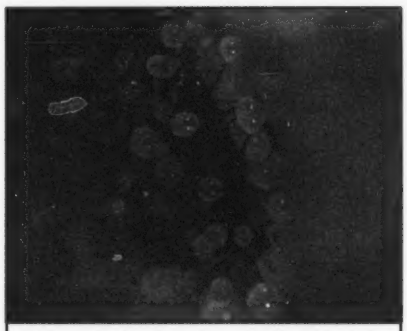

Figure 1: *Ophiostoma ulmi* in culture (the cause of Dutch elm disease). Source: Saskatchewan Agriculture

If you would like more information on DED, or suspect an elm is infected, contact the DED hotline at 1-800-SASKELM, or submit a sample to the Crop Protection Lab.

For information about submitting samples to Saskatchewan Agriculture's Crop Protection Lab go to:
www.agriculture.gov.sk.ca/Crop_Protection_Lab;
or phone (306) 787-8130.

Agriculture Knowledge Centre

Hours: 8 a.m. to 5 p.m. Monday to Friday
Phone: 1-866-457-2377

Got a question?
E-mail: aginfo@gov.sk.ca
Want to submit your question online?
Go to our http://www.agriculture.gov.sk.ca/ask_saskatchewan_agriculture form page.

When to Stop Spraying Fungicides

By Faye Dokken-Bouchard, PAg, Provincial Specialist, Plant Disease

With heightened awareness about plant disease due to increased incidence in 2010, many farmers were prepared for a fungicide application this season. But the decision whether to spray or not continues to raise more questions than answers. What if disease wasn't noticed until after the proper application period passed? How late is too late to spray? When are multiple fungicide applications warranted? Will the resulting yield benefit cover the application costs? Consider the following factors to determine when to spray and when to stop applying fungicides.

Crop Considerations

- Variety: What is the disease resistance rating and what are realistic expectations for the type of crop or specific variety under current conditions? For example, chickpea varieties with 'very poor' resistance are likely to have some pod lesions, even with an intensive fungicide program during the season. Blackleg may appear on otherwise resistant canola varieties if they have been damaged (hail). We don't know much about stripe rust resistance at this time - some wheat varieties have received preliminary ratings of poor, fair or good - take note of any differences you observe this season.
- Staging for cereals: Spray at flag-leaf emergence for leaf spots and rusts, as photosynthesis by the last two leaves on the plant contribute the most to yield. For fusarium head blight (FHB), spray when the main head is 75 to 100 per cent emerged and no later than 50 per cent flowering. Wheat is susceptible to FHB during flowering. By the time you see FHB symptoms, it is too late to spray. Stripe rust can also spread to the glumes, so a fungicide application at FHB timing may provide added benefit if stripe rust is observed after the flag leaf stage.
- Staging for pulses: Generally, the recommendation is to spray during flowering to protect the crop yield; applying fungicides later in the season to protect new growth may delay crop maturity. Applications after canopy closure are generally ineffective in controlling sclerotinia white mould and botrytis grey mould in lentils because these diseases develop in plant canopies too dense to allow penetration of a fungicide. Later fungicide applications can protect the developing seeds from infection (seed growers may benefit); however, once the crop starts to visibly ripen it will likely not make a difference. Most pulse crop pathogens need moisture and green, living tissues to infect and spread.
- Staging for canola: Spray at 20 to 50 per cent bloom as the fungicide needs to cover the petals in order to protect against sclerotinia. By the time you see symptoms of sclerotinia, it is too late to spray. The earlier the infection takes place, the greater the potential damage; therefore spray to protect the most blossoms at the earliest stage. Petals infected after 50 per cent bloom may still lead to disease, but the impact will be less intense as the petals are likely to drop into the upper canopy and later infections have less time for the disease to progress.

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When to Stop Spraying Fungicides

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Disease Severity and Other Factors Affecting Condition of Crop

- Is disease present? Fungicides cannot cure disease. If effective control has not been achieved during the season and symptoms are already widespread, it is usually too late to apply a fungicide.
- Has the crop been damaged by other factors? Are there other reasons it may not be worth saving? Do you expect the crop to recover? Crops often recover from damage such as hail if it occurs early in the season; however, if significant injury occurs during podding/seed development, crops are less likely worth saving.
- Will flowers developing now have time to mature before fall frosts? For example, pulse crops require about one month to form mature seeds from flowers. Protecting late-season growth in August is rarely economical in regions where fall frosts are common in the first two weeks of September.

Weather Conditions

- Warm, dry weather will naturally control diseases as well as help crops mature.
- Cool, wet weather will favour disease and potentially delay maturity.

Estimated Yield and Crop Value

- What disease impact are you expecting and to what degree do you anticipate that a fungicide will improve the crop yield/quality?
- Will you make enough money after harvest to pay for the application(s)?

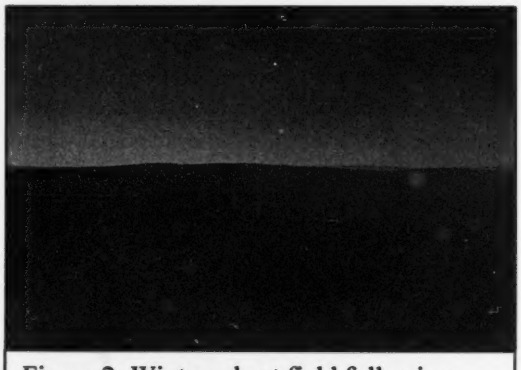

Figure 2: Winter wheat field following fungicide application (note sprayer tracks). Now past staging for further applications (finished flowering). Source: Saskatchewan Agriculture

		Expected Gross Return ($/acre) =		
Estimated Yield (unit/acre)	X	Estimated Yield Savings (%)	X	Selling Price ($/unit)
		Expected Net Return ($/acre) =		
Expected Gross Return ($/acre)		minus		Fungicide application costs

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When to Stop Spraying Fungicides
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Other Fungicide Application(s) Considerations

- How many times has the crop already been sprayed? Do you expect this to be the last spray? Have you already reached the maximum number of applications allowed by the fungicide label?
- Have you used a proper fungicide rotation to prevent fungicide resistance?
- Are you too close to harvest? Follow the recommended pre-harvest interval of the fungicide (check the *Guide to Crop Protection* or product label). Some examples:
  - Astound (cyprodinil + fludioxonil): canola 35 days;
  - Bravo (chlorothalonil): lentil/chickpea 14 days, peas 32 days, wheat 30 days;
  - Caramba (metconazole): cereals 30 days;
  - Folicur (tebuconazole): wheat 36 days;
  - Headline (pyraclostrobin): pulses 30 days, oilseeds 21days, cereals no later than end of flowering;
  - Lance (boscalid): pulses and canola 21 days;
  - Mancozeb products (Dithane/Manzate/Penncozeb): lentil 35 days, wheat 40 days;
  - Proline (prothioconazole): barley and wheat 30 days, canola 36 days, chickpea and lentil seven days;
  - Propiconazole products (Tilt/Bumper/Pivot): cereals 45 days, canola 60 days;
  - Prosaro (prothioconazole + tebuconazole): cereals 36 days;
  - Quadris (azoxystrobin): canola 30 days, coriander 21 days, pulses 15 days;
  - Quilt (azoxystrobin + propiconazole): pulses 30 days, cereals 45 days;
  - Rovral Flo/RX (iprodione): canola 38 days;
  - Serenade (biofungicide): can be applied up to harvest; and
  - Stratego (propiconazole + trifloxystrobin): cereals 45 days.

When deciding whether to stop spraying fungicides, keep the disease triangle in mind: the stage of the host crop; the potential of the pathogen to cause further damage and the environmental conditions expected for the remainder of the season. ☼

Insect Update

By Scott Hartley, PAg, Provincial Specialist, Insect and Vertebrate Pests

Based on Degree Day (DD) accumulation, **wheat midge** emergence appears to be nearing 90 per cent completion in the southwest, southeast and central regions of the province. The DDs indicate that midge emergence is about 50 per cent (July 18) in the northwest, northeast and north central regions. The high temperatures throughout the province will accelerate both midge emergence and wheat development. After 90 per cent emergence, the wheat midge numbers tend to drop off rapidly. Refer to the wheat midge map on the Weatherfarm website for details in your region.
http://weatherfarm.weatherbug.com/farm/login.aspx

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Insect Update
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Determining crop stage and associated susceptibility to the wheat midge is critical at this time of year. Due to delayed midge emergence in 2011, early seeded crops may have already completed flowering. Wheat is susceptible to midge damage from the time when the wheat head becomes visible as the boot swells and splits until flowering (anthesis). The wheat plant develops "resistance" through the build-up of ferulic acid that will deter the midge feeding. However, note that anthesis in an individual wheat head is not simultaneous. Generally, anthers emerge first in the middle of the head with the basal and top portions completing flowering later. Tillers also mature later than the main stem, therefore damage to wheat plants can vary among tillers and even among kernels within a single head. In most years, the primary yield components of the wheat plant will be in the main stem and first two tillers, therefore these are the most important to monitor during midge emergence and to protect with insecticide, if necessary.

If the adult midge are flying and the crop is in a susceptible stage, regular field scouting on multiple nights in succession is important to understand the dynamics of the midge population in a particular field. This information is critical to making a sound decision with respect to the necessity and timing of control.

Reports of **aphid** infestations have been common during the past week, with many areas affected throughout the province. Aphids in canaryseed are almost an annual occurrence. The pea aphid in pea crops has been primarily an eastern Saskatchewan problem, but not every year. The recent reports note that lentil and pea crops have been affected in the southwest.

Being soft-bodied, aphids are very sensitive to physical disturbance. A heavy rain or severe wind can dislodge aphids and reduce their numbers in a crop. Regular monitoring is essential to identifying changes in population densities.

Aphids suck plant sap, when the sap is actively flowing for the purpose of filling seeds. If seed filling is complete and the crop is no longer lush and actively growing, the next generation of aphids may emerge in a winged form and migrate to other greener crops.

High numbers of aphids feeding at the base of flowers and on developing pods may result in abortion of flowers and reduced filling, and possibly fewer seeds per pod. However, if there is sufficient moisture, the plants can compensate for some of the sap lost to the aphids. A crop under moisture stress may be more adversely affected by aphids.

Timing and necessity of insecticide applications: Decisions should be made on a case-by-case basis. Applying insecticide too early will be unlikely to provide a yield response, but will affect beneficial predators (e.g. lady beetle larvae and adults) and wasp parasites. Late application would have no beneficial result and will be an unnecessary expense as the aphids cannot damage crops that have completed seed filling.

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Insect Update

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Research has shown that the best time for insecticide application for economic infestations of aphids on peas is at **late flowering to early podding**. From this stage until the soft dough stage there will be a gradually diminishing yield response as a result of insecticide application.

Beneficial insects and disease can play a major role in managing aphid populations. Aphids have many predators aside from lady beetles including ambush bugs, minute pirate bugs and hover fly larvae. Several species of tiny wasps lay their eggs in aphid nymphs, killing the nymph. The result is grey or tan bloated but empty aphid bodies referred to as "mummies". There is a larger exit hole in the mummy, from which the adult wasp has emerged. In humid conditions, an entomophthoran disease can kill large numbers of aphids. These natural control agents may not be effective in reducing large infestations, but when aphid numbers are near threshold levels, bio-control may be a better alternative than insecticides. Because of their rapid ability to increase numbers, aphids have been known to rebound to high levels several weeks after insecticide application. **Regular monitoring for these beneficial insects, as well as for the aphids, is important and can save considerable expense and labour.**

Aphids have specific host crop preferences. Although some may feed on more than one crop, not all aphids will attack all crops. Aphids noted in pea and lentil will be predominantly the pea aphid. However, in canola there are up to three species that could be encountered. The species feeding on canola leaves are generally not a concern; however, the turnip aphid tends to cluster on stems, often near pods and flowers and can affect pod filling.

Keep in mind that there are several factors affecting the economic thresholds (ET) and control decisions - market value of the crop, cost of control, moisture conditions, and crop stage.

1) Field Peas: Currently the ET recommended is two to three per 20 cm plant tip at late flowering to early pod. This is based on an older variety (Century pea), and newer varieties may be able to tolerate more aphid feeding. Research on aphids on peas by Dr. Bob Lamb (Agriculture Agri-Food Canada, Winnipeg) provides an estimate of yield loss related to aphid numbers (Table 1).

Table 1. Estimate of Yield Loss Related to Aphid Numbers

Aphids per tip	Per cent yield loss
1	3.4
2	4.9
3	6.1
4	7.1
5	8.0
6	8.8
7	9.6
8	10.3

Figure 3: Aphids on pea. Source: Saskatchewan Agriculture

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Insect Update
(Continued from page 7)

2) Lentil: According to recommendations in North Dakota, the ET for aphids in lentil involves three qualifiers: 30 to 40 aphids per 180 degree sweep **and** few natural enemies are present **and** aphid numbers do not decline over a two-day period.

3) Canaryseed: Based on U.S. and Australian research, the current recommendation for insecticide application for aphids on lentil is 10 to 20 aphids on 50 per cent of the stems.

4) Cereals (e.g. wheat,barley): 12 to 15 aphids per stem prior to soft dough stage.

Figure 5: Aphids on canola.
Source: Saskatchewan Agriculture

Figure 4: Aphids on lentil.
Source: Saskatchewan Agriculture

5) Canola: As a guideline, researchers have suggested that if 10 to 20 per cent of the stems have clusters of the turnip aphids, control is likely warranted. ✿

Bertha Armyworm Monitoring Program

By Sean Miller, PAg, Integrated Pest Management Agrologist

The 2011 Bertha Armyworm Monitoring Program continues to receive data from co-operators throughout July and will be completed in early August. Cool temperatures in May and early June delayed the emergence of the adult bertha armyworm moths from their over-wintering pupal stage. Few adult moths were reported prior to the last week in June 2011.

The Bertha Armyworm Risk Map is posted on the Saskatchewan Ministry of Agriculture website at www.agriculture.gov.sk.ca/maps_section. The map will be revised weekly until early August when traps are removed from fields. Mid-July captures suggest there are potentially moderate risk areas in the RMs 286, 351, 379 and 437.

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Bertha Armyworm Monitoring Program

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Weekly moth numbers have peaked and are starting to decline in many areas, indicating the completion of the adult moth stage. The map (Figure 6) indicates higher numbers in some areas and lower levels within close proximately, emphasizing the importance of individual field scouting.

General recommendations based on observed moths numbers from pheromone traps:

- 0 to 300 = low risk; control measures unlikely in most cases.
- 300 to 900 = uncertain, most variability for this level; periodic monitoring of fields to verify actual numbers of larvae (especially bolting fields) is required.
- 900 to 1,200 = moderate risk; check for larvae and evidence of damage.
- 1,200 to 1,500 = high risk; monitor fields more frequently

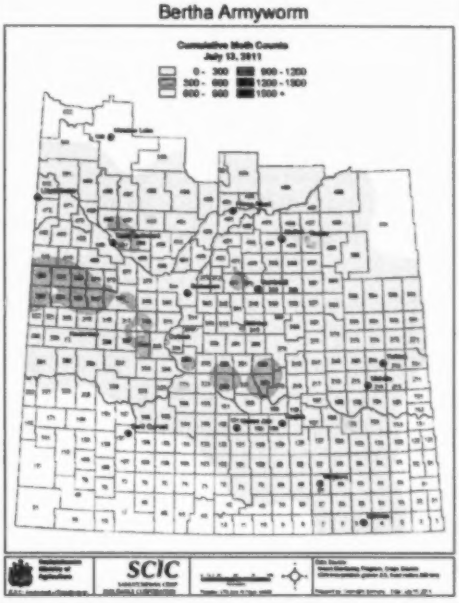

Figure 6: July 13, 2011 Bertha Armyworm Risk Map.
Source: Saskatchewan Agriculture

It is important to remember that forecasts are not 100 per cent accurate. The most accurate method to determine numbers of destructive larvae on a local basis is through individual field monitoring. This should begin in late July and continue until the number of larvae exceeds economic thresholds and the crop is sprayed, or until the crop is swathed. Bertha armyworm thresholds can vary based on the expected price of canola and the cost of insect control (insecticide and application cost). Using the current crop value and the insecticide application costs, Table 2 indicates the number of larvae per square metre at which an insecticide treatment in canola is warranted. Remember to check the pre-harvest interval for the insecticide being applied.

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Bertha Armyworm Monitoring Program
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Table 2: Economic thresholds for bertha armyworm on Argentine canola

Cost of Spraying ($/acre)	Expected Value of Canola to Grower ($ per bushel)										
	6	7	8	9	10	11	12	13	14	15	16
	# of larvae / square metre										
6	17	15	13	11	11	10	9	8	7	7	6
7	20	17	15	13	12	11	10	9	9	8	8
8	23	20	17	15	14	13	12	10	10	9	9
9	26	22	19	17	16	14	13	12	11	10	10
10	29	25	22	19	17	16	15	13	12	11	11
11	32	27	24	21	19	17	16	14	13	13	12
12	34	30	26	23	21	19	17	16	15	14	13

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Round Bale Storage Tips

By Michel Tremblay, PAg, Provincial Specialist, Forage Crops

The most common technique in North America for harvest of forage crops is making hay. When put up correctly, hay is cost effective, meets the nutritional needs of nearly all classes of livestock and, if protected from weather damage, can be stored almost indefinitely. Round bales have become the industry standard for hay-making systems due to their capacity, the mechanization of hay handling and the reasonable cost of the machinery required. All forage harvesting systems are susceptible to dry matter losses, which result in higher costs through lost production and lower feed value. The final stage of hay making is hay storage. Round bales are susceptible to considerable dry matter losses due to weathering if not stored properly.

Storing feed with a moisture content in excess of 20 per cent should be avoided. Excessive moisture in stored hay will result in heating and mould. If hay is baled and stored at safe moisture levels, the main risk during storage is weathering, which is the removal of soluble nutrients by water moving over or through the bales.

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Round Bale Storage Tips
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The majority of weathering losses in round bales occur in the circumference of the round side of the bale. The size of the bale has an impact on the proportion of the hay that is in the surface layer. Larger bales have less exposed surface as a percentage of total feed in the bale. A round bale six feet in diameter will have 20 per cent spoilage if the outer four inches of the circumference is weathered. A five-foot bale will have 25 per cent spoilage with a similar depth of weather damage around its circumference. In high moisture conditions, it is possible to have up to eight inches of spoiled hay on the outside of a round bale.

Figure 7: Round bales stored incorrectly.
Source: Saskatchewan Ministry of Agriculture

Weathering of hay increases exponentially because spoiled hay is more easily penetrated by water. A round bale that has a wet layer does not shed water well, and internal moisture levels increase. Once a round bale gets wet, mould can develop. Mouldly hay dries more slowly than unspoiled hay. Spoilage accelerates as the bale takes longer and longer to dry after a rain, compared to an unspoiled bale. To put the amount of water and potential spoilage that can occur with stored round bales into perspective, one inch of rain will leave approximately 22 gallons of water in a six foot by six foot round bale.

Weathering and spoilage accelerates when the round sides of two bales are in contact. This results in moisture being directed into and trapped in the bale, and can account for as much as 50 per cent or more of storage losses. Storing bales with round sides touching should be avoided. Bales contacting damp soil draw up moisture.

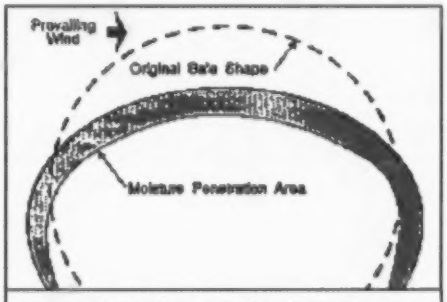

Figure 8: Weathering affects bale shape.
Source: Prairie Agricultural Machinery Institute

As spoilage occurs, the bale flattens, increasing the surface area exposed to the damaging effects of damp soil. Flattening also reduces the angle of the top of the bale, increasing the bale's exposure to moisture coming from above (Figure 8). Dry matter losses can be reduced by wrapping bales in plastic, tarping or storing them in a hay shelter. However, there are simpler and less expensive ways to reduce weathering. Some of the most important factors that affect round bale storage losses are bale density, climatic conditions, storage site conditions, bale orientation, bale placement and level of protection of tops and bottoms of bales.

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Round Bale Storage Tips
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Increased bale density enhances the ability of round bales to shed water. Even, uniform windrows make formation of consistently shaped and dense bales easier. Smaller windrows generally result in denser bales, as there are more layers per roll. Finely textured grass bales shed water more effectively than coarsely textured hay. Mature forages, weedy hay and mature alfalfa allow more rapid infiltration of water due to large, hollow stems and increased bale porosity.

Wrapping the bale with twines closer together increases the ability of the bale to shed water, but increases baling costs and slows the baling process. Net wrap can reduce losses slightly, but costs more than twine.

The nature of rainfall can impact spoilage. One large rain is less damaging than the same amount of rain received over an extended period. Warm, cloudy conditions increase spoilage rates in stored hay.

Round bale storage areas should be located as close to the feeding area as possible to minimize losses when moving weathered hay. It is also important to choose an area with low flooding and fire risk. Choose a south-facing slope on well-drained soil to encourage solar drying and drainage of water away from stored bales. Bales should be piled in single rows oriented north to south, to maximize solar drying of hay.

Flat sides of bales should be butted tightly against each other to protect the ends and bottoms from getting wet. Rows should be at least three feet apart to allow for air circulation and sunlight penetration.

Round bales are the industry standard for hay in Saskatchewan. They are economical and efficient to make, but can be prone to dry matter losses during storage. Minimize losses by maximizing bale density and ensuring correct storage techniques. ☼

Assessing Damage Symptoms in Lentil

By Dale Risula, PAg, Provincial Specialist, Specialty Crops

Plant damage can either be biotic (living organisms) or abiotic (non-living). Severe weather is often the cause of abiotic damage to plants. This may include extreme temperatures, hail, high winds, sun/rain bleaching, soil abrasion, mechanical damage or nutrient- and toxicity-related issues. Biotic damage is caused by insects, diseases or wildlife. It is important to know the source of the damage before taking corrective action.

Some insects, such as grasshoppers, are more prevalent in dry conditions. However, biotic damage in lentil is often caused by fungi and insects associated with wet conditions. Therefore, rainy weather should tell us to check lentils for plant diseases. Two diseases high on the list of probability are: botrytis grey mould and anthracnose.

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Assessing Damage Symptoms in Lentil
(Continued from page 12)

Figure 9: Stemphylium Blight in Lentil.
Source: Saskatchewan Agriculture

Ascochyta blight, sclerotinia white mould and stemphylium blight are other diseases that could be a problem in moist conditions. Some lentil diseases can be treated with applications of registered fungicides. If the problem is identified early and the fungicide is applied before canopy closure, diseases can be controlled.

It is important to be as thorough as possible when surveying the field. Abiotic damage is often misdiagnosed as a disease or insect problem. It is easy to make a mistake; however, looking more closely at the plant and surrounding area (soil, environment) can mitigate the chance of error. You must try to understand the mechanics of the scene and come up with a satisfactory explanation. There are some tools of the trade that will help you: a magnifying glass, books or fact sheets with disease and insect photos, collection jars, bags, and a trowel for digging up roots. Make it more comfortable for yourself, too, by having rubber boots, long pants/shirt, hat, and insect repellent handy.

Problems that don't seem to be spreading and are associated with recent environmental events are likely abiotic in nature. Hail, wind, excessive precipitation or some other similar type of event may have caused the problem. If symptoms can't be easily related to recent weather and are taking more time to develop and are spreading from plant to plant with the affected area increasing, you likely have a biotic problem (such as a fungal pathogen or insect).

Sometimes symptoms may exhibit conflicting characteristics. For example, some herbicides can become more damaging following extreme precipitation. Herbicide can be washed into the soil, taken up by the roots, and eventually cause damage to the crop as it circulates within the plant's vascular tissue. So the source is abiotic, but the damage continues to increase because the residue continues to be absorbed and moved through the plant system.

Additionally, it is important to gather and record historical information on the field, such as current weather data, insect reports, conditions and symptomology (i.e. look for pycnidia or other plant disease symptoms). This information will help you accurately diagnose the problem to make better decisions about the actions you take.

The Crop Protection Laboratory can help to accurately determine the cause of crop damage. Information about the lab and how to submit a sample is available on the Saskatchewan Agriculture website. ✿

Saskatchewan Sunflower Committee
Tour & Meeting

Wednesday, July 27, 2011

Agriculture and Agri-Food Research Farm, Indian Head

11:00 a.m.Saskatchewan Sunflower Committee Meeting

12:00 p.m.Lunch

1:00 p.m.Plot Tour including:

- **Evaluation of Early Sunflower Hybrids for Saskatchewan**
- **Hybrid Sunflower Response to Nitrogen**
- **Test Crosses of Early Maturity Sunflowers from Brent Hulke's North Dakota Breeding Program (USDA)**
- **Rates of Authority (sulfentrazone) on Sunflower**

For more information or to confirm attendance (by July 22 for meal planning) contact:

Elaine Moats, Saskatchewan Agriculture 306-848-2856
Bill May, Agriculture and Agri-Food Canada 306-695-5225

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